Onsite Sewage System Design Requirement Recommendations

All items referenced in this document must be in accordance with 410 IAC 6-8.2, effective Jan 1, 2011.

While 410 IAC 6-8.2 does not list required onsite sewage system design components, it does require *"plans of sufficient clarity that it can be verified that the design of the residential onsite sewage system shall comply with the provisions of this rule."* A highly detailed system design is necessary to fulfill this objective.

The purpose of a system design is to provide an accurate reference tool for use throughout the permitting and installation process. An effective design will reflect the best choices in layout, system functionality and cost. The design is the cornerstone of the planning process.

Erroneous designs can lead to faulty installations, violations and expensive remedies. The health department's challenge is to verify that each design is accurate on paper *and* in the field before the design is approved and the permit is issued. Plan review is the process in which these errors are discovered *before* they become "real world" problems.

Tip: All drawings, no matter how professional looking, must be "authenticated" by means of a full review and site visit, by the health department, prior to the permit being issued.

Accurate measurements *in system design are important, but precise vertical measurements (elevations) are vital. For example, designs specify trench depths in inches and pipe grade of as little 0.2% (1/4" in 10') of length.*

Extrapolating system grade elevations from third party contour lines (e.g. GIS or USGS maps or topographic surveys produced by someone else) result in unreliable data and should not be allowed. Existing grade shot elevations at the proposed system (as needed) are essential.

Who can design a system? Many onsite sewage system industry persons are capable of producing the type of detailed design necessary to ensure a smooth permitting and installation process. These people may include, but are not limited to, installers, excavators, designers, builders and engineers.

I. Steps in the Permitting Process:

A. On-site evaluations (including soil borings) are conducted by a soil scientist to evaluate the site. The health department and a designer with a laser level are recommended to be on-site when the borings are conducted. Prior to conducting the on-site evaluation, check for flood plain or easements on the property which could affect the system location.
B. Onsite sewage system requirements are issued by health department.
C. The proposed system is marked on-site by flagging, staking or by other durable means as part of the design process
D. Design is submitted to the health department for review.
E. Plan review must include a site visit by the health department to evaluate the proposed system layout prior to the design approval.
F. Once approved, the plans are marked APPROVED and dated by health department.
G. Permit is issued with an attached copy of the approved plans. Permit card must specify the version (date and revision number) of the plans approved.

II. All onsite sewage system designs must include:

A. General system information including:
   1. Site address/location, owner's name, health department project/application # (if applicable)
   2. Number of bedrooms and bedroom equivalents (including residential outbuildings with plumbing)
   3. System type and size
   4. Maximum and minimum trench depths (where applicable)
   5. Proposed tillage depth for mound systems (if applicable)
   6. Perimeter drain or interceptor requirements (if applicable)
   7. Designer name and contact information
   8. Design date and revision date and description

B. Design drawing must be to scale (1"= 20' or 1"= 30' preferred). A smaller scale may be used if the design is still legible. A drawing scale legend must be included.

C. Name and location of all components of the proposed onsite sewage system and their details [manufacturer and size of tanks (including effluent filter), pipe size, specifications, locations, lengths, pump model, etc.]

D. Proposed and existing homes, outbuildings, decks, patios and sidewalks, drive-ways, etc. (especially if they are in the vicinity of the proposed system)

E. Property lines, easements, road right-of-ways, regulated drains and their associated right-of-ways

F. Water wells on the property and all wells within 75' of the proposed system. Also show all commercial wells within 125' and public supply wells within 250' of the proposed system. Note: Well separation distances are doubled when soil loading rates are > 0.75 gpd/ft^2 unless that hazard can be overcome through on-site design.

G. Dispersal area

H. Lakes, streams/rivers, retention areas, ditches and swales on the property or within 75' of the proposed onsite sewage system

I. Existing tank(s).

J. As much info as possible about existing soil absorption field system, including location (where applicable)

K. North arrow and scale

L. Future additions, swimming pools and outbuildings (if known)

M. Cross sectional view of trench, bed or mound showing depths, elevations and materials

N. Soil boring locations, boring numbers and person that performed the borings.

O. Direction of slope (noted with arrow)

P. Location of utilities (if know and when applicable)

Q. Location of reserve area (when applicable)

R. Temporary Bench Mark location and elevation (usually set to 100.00' unless local requirements indicate USGS elevations must be used)

S. System relevant elevations:
   1. Adequate existing grade elevations to illustrate that the proposed system will meet code and the installation is achievable. (e.g. grade shot elevations along each trench, grade shots at mound around sand perimeter and bed)
   2. All elevations throughout the system (including pipe inverts) showing slopes, trench bottoms, perforated pipes, tank and D-box inlets and outlets, house sewer elevation, drain elevations, mound bed, manifold, laterals, etc.)

3. When a 100-year floodplain elevation is suspected of encroaching onto the site of a proposed system, the health department must require flood plain elevations as part of the design. When this is the case the following must be provided prior to permit issuance:
    a. the difference in elevation between the temporary bench mark and the 100 year flood elevation;
    b. the difference in elevation between the top of the septic tank and the 100 year flood elevation;
    c. the difference in elevation between the top of the dosing tank and the 100 year flood elevation (if applicable);
    d. for subsurface trench systems, the difference in elevation between the proposed trench bottoms and the and the 100 year flood elevation; and
    e. for above ground systems, the difference in elevation between the ground surface at each of the four corners of the basal area of the system and the 100 year flood elevation.

T. For a subsurface trench system, the beginning and end of each trench.
U. For an above ground system, the corners of the gravel bed, corners of the system sand, and corners of the soil cover.
V. Location of all existing trees, bushes, laundry or flag poles, mini garden ponds or any other structures in the area of the proposed onsite sewage system.
W. Perimeter drain location and depth. Adequate number of grade and invert elevations to illustrate drain d*epth, proper slope and free to flow by gravity to a sufficient outlet.* Rodent guards must be included on tiles that outlet to daylight.

III. Dosing Tank Details:

A. Tank manufacturer, size and type (shallow or standard). Indicate storage capacity in gallons per inch of tank depth.
B. Specify force main, schedule and diameter inside tank
C. Scale cross sectional view of tank with dimensions:
    1. Floor to pump off in inches (pump must stay submerged for cooling)
    2. Height of pump plus pump block if applicable
    3. Pump "on" to pump "off" in inches (multiplied by gallons per inch shows amount of dose)
    4. Distance between pump "On" and alarm
    5. Show the distance and volume between alarm on and tank inlet invert elevation
D. Elevations at tank inlet and outlet invert elevations, top of tank and final grade at tank
E. Pump "off" elevation and difference between pump "off" and the highest point in the force main, D-box inlet or manifold elevation (to calculate static lift)
F. Height of proposed riser
G. Note stating if the force main is to drain back to the tank, forward to the field or remain full below the frost layer.
H. Route and elevation of proposed effluent force main exiting tank (through riser or regular tank outlet). This elevation is needed to show that effluent force main will drain (back to the tank or forward to the field OR is proposed at frost layer).
I. Specify weep hole size and location in dosing tank for drainback (when applicable)
J. Specify check valve and location (when applicable)
K. Gallons per dose (includes drain back if applicable)
L. Specify non corrosive lift chain or rope (cable)
M. Specify proposed quick release and location (Union, cam-lock, break away flange, etc.)

N. Specify that audio and visual alarm and pump will be on separate circuits
O. Location and type of junction box
P. Protective measures must be taken to prohibit siphoning to or from the dosing tank (when using a typical dosing tank with an electrical pump). Vacuum breaks, in the form of a 1/4" weep hole in the force main inside the dosing tank (above the high water line) or as recommended by the pump manufacturer *and* a vented elbow or tee fitting on the inlet of the D-box should eliminate any risk of siphoning.

The pump proposed on the design must be one that is "in stock" or readily available from a local supplier. If, prior to installation, a different pump is desired, that new pump must first be approved by the system designer and health department BEFORE the new pump is installed.

IV. Flood Dose Hydraulics:

A. Effluent Force Main - Length, diameter and pipe specifications
B. Static head- Difference between pump off elevation and Highest point in the force main usually the D-box inlet)
C. Calculated friction loss in entire length of effluent force main. Include fittings and valves
D. Total Dynamic Head (Static lift + Friction Loss)
E. Illustrate operating point (GPM and Total DH) on pump performance curve
F. Details on proposed effluent or sewage pump
    1. Manufacturer
    2. Model
    3. Performance curve and operating point
    4. Height
    5. Voltage, phase and running amps

V. Mound System/Pressure Hydraulics:

A. Effluent Force Main - Length, diameter and pipe specifications
B. Manifold - Length, diameter and pipe specifications
C. Distribution Laterals - Number of laterals, length of each lateral diameter and specifications
D. Lateral 1/4" holes - Spacing and total number of holes including one in the crown of each lateral end cap. Include weep hole(s) inside of dosing tank
E. Calculate total discharge rate in gallons per minute (discharge rate of 1.28 gpm x total number of holes)
F. System design head of 3.0'
G. Static Head - Difference between pump off elevation and top of lateral elevation
H. Calculation showing the dosing volume minus drain back is > volume of laterals x 7
I. Calculated friction loss in entire length of effluent force main (pump to manifold). Include fittings, valves and filters
J. Total Dynamic Head (Static lift + Friction Loss + System Design Head)
K. Details on proposed effluent or sewage pump
    1. Manufacturer
    2. Model
    3. Performance curve and operating point
    4. Height
    5. Voltage, phase and running amps

Published: Dec. 8, 2011